

NOMINATION
of the
**GRENFELL STREET POWER
AND CONVERTER STATIONS**
for an
HISTORIC ENGINEERING MARKER



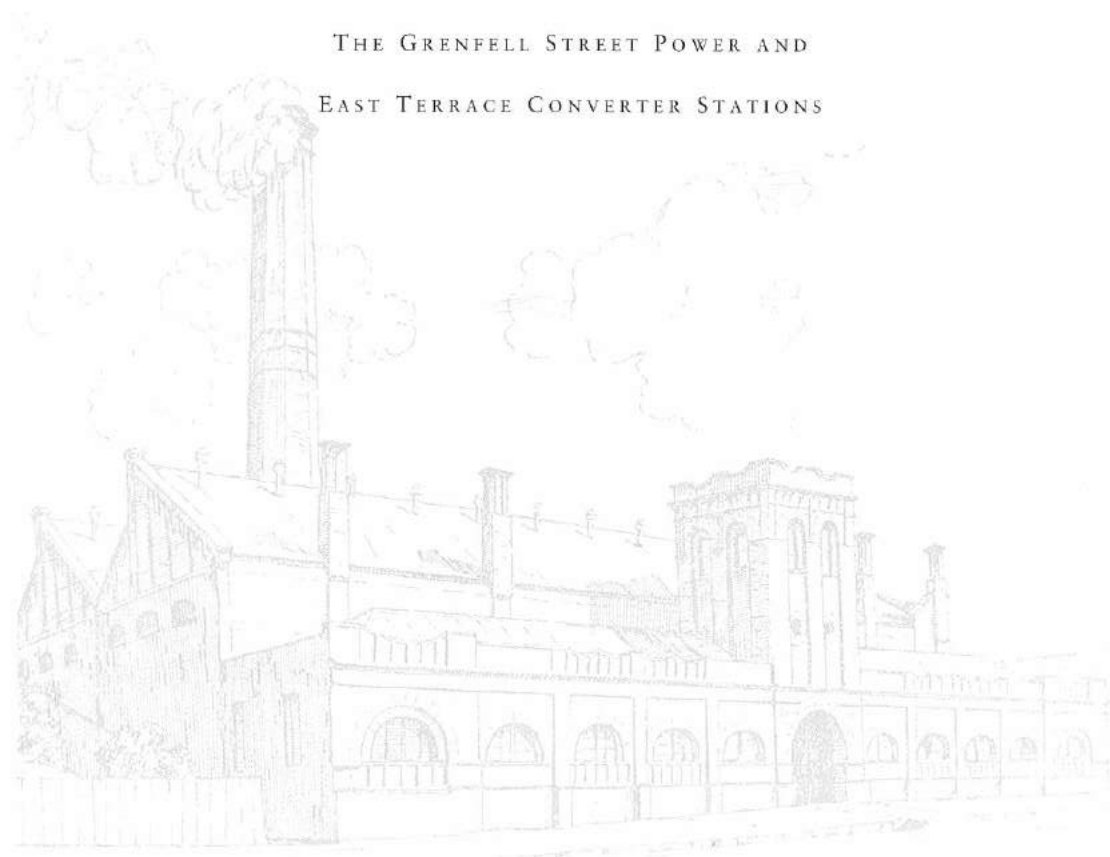
By the
Engineering Heritage Branch
IEAust SA Division

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100 YEARS OF PUBLIC ELECTRICITY

THE GRENFELL STREET POWER AND
EAST TERRACE CONVERTER STATIONS



The Grenfell Street Power and East Terrace Converter Stations mark the site from which The South Australia Electric Light and Motive Power Company generated the first public electricity supply to light the City of Adelaide.

The company, which was incorporated in 1895 was succeeded by the Adelaide Electric Supply Company (1904-1946) and then ETSA. The power and converter stations also supplied the electricity for Adelaide's electric tramway system.

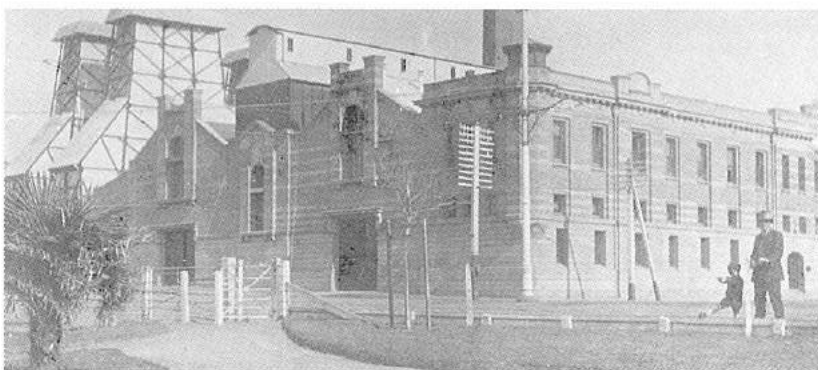
Three main buildings compromise the Grenfell Street Power and East Terrace Converter Stations.

GRENFELL STREET POWER STATION BUILDING

The Grenfell Street power station was officially opened on November 1, 1901 and operated until 1925.

Including an office block and turbine hall, it was designed by F.W. Wheadon, BSc, MIEE, MIEAust. Major extensions were carried out in 1912 so that what we know now as the Tandanya Aboriginal Cultural Institute is actually a third larger than the original building.

The supply of electricity to businesses and private residences from the power station made a significant contribution to the amenity of the city and the economic development of South Australia.



THE GRENFELL STREET POWER STATION

AESCO CONVERTER STATION

The AESCo (Adelaide Electricity Supply Company) converter station was fully operational from 1923 until 1929 and then provided a small backup capacity until the last of the DC (direct current) was removed from the city in 1967.

It was also designed by F.W. Wheadon and is still in use as a substation.



THE ENGINE ROOM OF
THE GRENFELL STREET
POWER STATION

MTT No 1 CONVERTER STATION

The MTT (Municipal Tramways Trust) No1 Converter Station powered Adelaide's electric tram system from 1909 to 1956.

Designed by Sir W.G.T. Goodman, KCB, MICE, MIEE, MIEAust, it included a machine room, transformer room and battery room.

Its most impressive feature is the front elevation which is based on the Romanesque Revival style. The date stone (dated 1908) of polished granite, to the right of the main door, presents a mystery: no one today knows why the Maltese Cross and the Star of David were chosen as ornaments.

The No1 Converter Station, which was purchased by ETSA in 1963, was entered in the Register of State Heritage Items on February 14, 1985. The building has now been adapted to provide modern office accommodation while preserving its industrial character and heritage.

The Institution of Engineers, Australia
Historic Engineering Marker
Ceremony Grenfell Street Power and
East Terrace Converter Stations

April 6, 1995

PROGRAM

WELCOME ADDRESS

Mr Deane Kemp, FIEAust, CPEng

SUPPORTING ADDRESS

Mr Clive Armour,
General Manager, ETSA

UNVEILING OF HISTORIC ENGINEERING MARKER AND PRESENTATION TO THE CITY OF ADELAIDE

Professor Douglas Clyde,
FIEAust, CPEng, National President,
The Institution of Engineers, Australia

The Lord Mayor, Mr Henry Ninio

CONCLUDING REMARKS

Mr Peter Koukourou FIEAust, CPEng

THE AUSTRALIAN ENGINEERING PLAQUING PROGRAM

This program has been operated
by the IEAust since 1984 as a
means of attracting public
attention to historic engineering
objects and sites and increasing
awareness of the significant
contribution made by engineers to
the development of Australia and
the welfare of its people.

The Grenfell Street Power and
East Terrace Converter Stations
are the sixth engineering work in
South Australia to be honoured
with an Historic Engineering
Marker Plaque.



The
Institution of Engineers,
Australia



City of Adelaide

ETSA

HISTORIC ENGINEERING MARKER: GRENFELL STREET POWER AND CONVERTER STATIONS COMMEMORATIVE PLAQUE NOMINATION

PREAMBLE: Grenfell Street Power and Converter Stations comprise three main buildings and interconnecting yards:

1. Grenfell Street power station building (office block and turbine hall)
2. AESCo converter station
3. MTT No1 Converter Station (machine room, transformer room, and battery room)

NOMINATION:

The following work is nominated for an Historic Engineering Marker

Name of Work: Grenfell Street Power and Converter Stations

Location: Grenfell Street and East Terrace, Adelaide

Owner: Tandanya Aboriginal Cultural Institute (power station building)

Electricity Trust of South Australia (converter stations and yards)

Adelaide City Council (plaque site)

The owners have been advised of the nomination of the work and confirmation of their willingness to participate is awaited

Access to the site:

Power station building: semi-public (Tandanya Aboriginal Cultural Institute)

AESCo converter station: restricted (houses an operational electricity substation)

MTT No1 Converter Station: limited (operational office for ETSA)

Future care and maintenance of the work:

Buildings have been partially restored and recycled as a museum and cultural centre, and an office building; the AESCo converter station is still used as an operational substation

Name of sponsors:

To be confirmed

Additional Supporting information:

1. **Name of Work:** Grenfell Street power station building
Year of construction: Work commenced in 1900
Officially opened on 1 November 1901
Major extensions (present facade) commenced in 1912
Period of operation: 1901 - 1925 when it was decommissioned
2. **Name of Work:** AESCo converter station
Year of construction: Work commenced in 1923
Period of operation: 1923 - 1967 as DC converter station; still in use as a substation
3. **Name of Work:** MTT No1 Converter Station
Year of construction: Work commenced in 1908
Period of operation: 1909 - 1956

All Buildings Engineering Heritage Significance:

Physical condition: very good

Technological/scientific value: low (plant removed)

Historical value: high

Social value: high

Townscape value: high

Rarity: buildings associated with Adelaide's first public electricity supply and electric tramways

Representativeness: —

Contribution to the region: Significant for Adelaide

Contribution to engineering: Electricity supply facilitated development of the city and state

Persons associated with the work: F W H Wheadon. BSc, MIEEE, MIEAust

Sir W G T Goodman. KCB, MICE, MIEEE, MIEAust

Integrity: Buildings remain; fabric is heritage listed

Authenticity: —

Comparable works in Australia or overseas: —

Statement of significance: see attached

Citation: see attached

Attachments to submission:

Item 42, Adelaide — Engineering and Industry, March 1992

Adelect, 1982, No 3

The No1 Converter Station Visitor's Guide, 1993

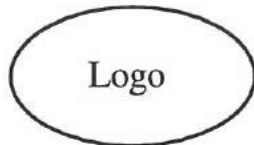
Electricity Supplies to South Australians, Donovan and Associates, February 1993

Proposed location of plaque:

North west corner of Rymill Park, adjacent power station building

Chairperson of SA Division Heritage Branch

**HISTORIC ENGINEERING MARKER:
GRENFELL STREET POWER AND CONVERTER STATIONS
PLAQUE CITATION**



**HISTORIC ENGINEERING MARKER
GRENFELL STREET POWER AND
CONVERTER STATIONS**

ETSA AND THE ADELAIDE ELECTRIC SUPPLY COMPANY (1904 - 1946) ARE SUCCESSORS OF THE COMPANY INCORPORATED IN 1895 TO PROVIDE ADELAIDE'S FIRST PUBLIC ELECTRICITY SUPPLY FROM THIS SITE. DESIGNED BY F W WHEADON, BSc, MIEE, MIEAust, THE POWER STATION OPERATED FROM 1901 TO 1925 AND THE AESCO CONVERTER STATION FROM 1923 TO 1967. ADELAIDE'S ELECTRIC TRAM SYSTEM, DESIGNED BY SIR W G T GOODMAN, KCB, MICE, MIEE, MIEAust, WAS POWERED BY THE MTT No1 CONVERTER STATION FROM 1909 TO 1956.

DEDICATED BY
THE INSTITUTION OF ENGINEERS, AUSTRALIA, 1995
THE ELECTRICITY TRUST OF SOUTH AUSTRALIA
THE ADELAIDE CITY COUNCIL

GRENFELL STREET POWER AND CONVERTER STATIONS

STATEMENT OF SIGNIFICANCE

This group of 4 buildings and the site of the fifth building facing East Terrace are relics from the earlier major industrial activity which once took place within the City of Adelaide. The Adelaide Electric Supply Company office on Grenfell Street, the adjacent 1901 power station and its 1912 extension, the site of the boiler house, 1923 converter station and the 1908 Municipal Tramways Trust Converter Station are significant in being associated with the first public electricity supply for the City of Adelaide and electrification of public transport.

In March 1895 the South Australian Electric Light and Motive Power Company was incorporated and was empowered under the 1897 Electric Light and Motive Power Company's Act to "provide electric lighting for the city and private places". The company entered into an agreement with the Adelaide City Council in 1898 to light the city and was the first and only company to successfully do so.

The power station commissioned in 1901 (and replacing a temporary 1899 powerhouse) and the development through to 1923 has contributed greatly to the amenity of the city, the electrification of public transport and the economic development of the city and South Australia by making a public electricity supply available to businesses and private residences.

The South Australia Electric Light and Motive Power Company is the founding company which via other companies has developed into the Electricity Trust of S.A. which in 1995 can celebrate 100 years of public electricity supply.

the theatre. Formby and Boase held some of Australia's largest sales, with buyers from all over the nation and from other parts of the world being present from time to time. The ring itself was described as one of the most capacious and best in Australia.

In about 1901, a large proportion of the theatre was demolished. The timber internal structure was simply sawn off at support points, and much of the stage area and rear structure was removed. This action led to the greatly reduced integrity of the theatre seen today.

41. RICHARDS MOTOR BODIES

T.J. Richards, Coach Builder, commenced business in 1885 at Bulls Creek Road, Lower Mitcham (now Price Avenue). With the advent of motor transport, the firm expanded rapidly establishing premises in Hindmarsh Square in 1901 with an extension through to Hyde Street in 1914. T.J. Richards and Sons modestly advertised themselves as "Australia's Leading Carriage and Motor Builders" and later the "King of the Road" Motor Body Builders.

They also operated from 95-99 Pulteney Street in 1914 selling Rudge, Pope and Swift motor cycles along with Swift and Dixi motor cars. Richards built motor bodies for Rugby, Durant, Oakland, Berliet, Chic, Dodge, Hupmobile, Moon, Citroen, Dort, Gray and Jowett cars. During the period 1920-22 Richards moved to "more commodious and up-to-date" premises at Leader Street, Keswick.

An association with Chrysler Corporation in 1935 led to the purchase of Richards' business by Chrysler to form Chrysler Australia Limited, who established the Chrysler plant at Tonsley Park during the 1960's. Subsequently Chrysler's association with Mitsubishi in the 1980's saw the formation of Mitsubishi Motors Australia Limited and the demise of the Chrysler name.

42. POWER STATION COMPLEX

Corner Grenfell Street and East Terrace.

The city's first public electricity was supplied from a site in Tam-O-Shanter Lane following the South Australian Electric Light and Motive Power Company contract with the Adelaide City Council to light the City electrically. (From the 1860's the city had been gas lit). The Electric Lighting and Traction Co., the successor of the earlier Electric Light Co. built a permanent power house on Grenfell Street/East Terrace Corner. Buildings on East Terrace proceeding from Grenfell Street to Pirie Street are as follows:

- Two storey office building for Adelaide Electric Supply Co. (AESCO) 1912, to replace original single storey structure. This building was re-opened in 1989 as the Tandanya Aboriginal Culture Centre.
- Power station, opened November 1901.
- Power house extension 1912.
- AESC Converter Station 1923 (to service Direct Current Consumers on decommissioning of Power Station).
- M.T.T. No. 1 Converter Station for tramway power supply, 1908 [600 v D.C. switchboard 75 ft. (23 m) long]
- E.T.S.A. System Control Building, 1965, erected on site of an earlier M.T.T. Line Terminal Yard.

- E.T.S.A. System Control Building, 1965, erected on site of an earlier M.T.T. Line Terminal Yard.

In 1904 the Adelaide Electric Supply Co. took over electricity supply operations and by 1907 its plant supplied all electric power in Adelaide including the tramway operations from 1909 until the M.T.T. generated its own. Operations ceased in 1925 after the completion of the first Osborne Power Station in 1923.

The Grenfell Street Station had major problems with the cartage of coal from Port Adelaide, and the supply of cooling water.

Power Station Building : Built by N.W. Trudgeon (Mayor of St. Peters) at a cost of 4325 pound to design by Architect Alfred Wells.

Power Station Voltage : Initially 200 v D.C. with the later introduction of 200 v A.C. and high voltage for extended distribution.

Output : Initially 150 kW increasing to 12250 kW. Compare with Torrens Island Power Station today at over 1000 MW.

Plant : Ultimately ten Babcock & Wilcox boilers two brick chimneys, eight cooling towers, a variety of reciprocating and turbine driven generators (both DC and AC) and several DC to AC motor generator sets.

Distribution Method : Initially by underground cable.

Plant Design : F.W. Wheadon, BSc., MIEE., MIEAust.

Significance : Adelaide's first permanent public electricity supply (and by private enterprise). Outstanding benefit to the Community.

National Trust of S.A.
Classification : Classified

43. DUNCAN & FRASER UNITED 42-46 Franklin Street.

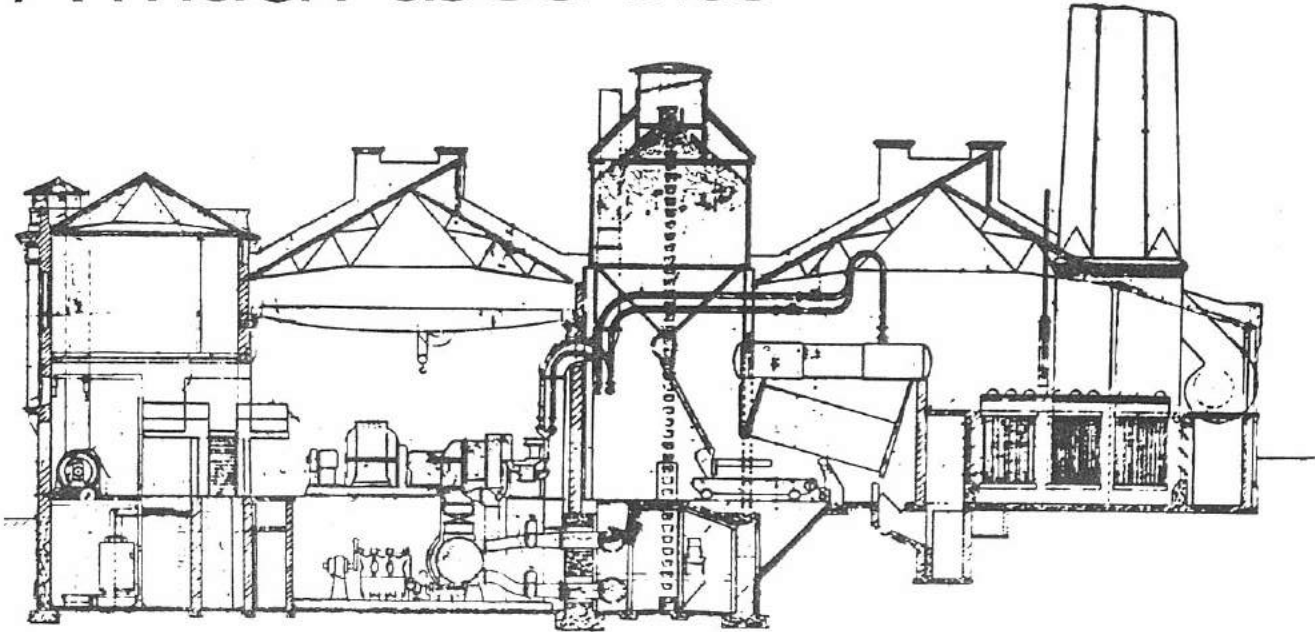
The offices and workshops for the various activities of Duncan & Fraser were located here. From building coaches (Directory 1878) they progressed to manufacturing the first electric tramcars for the M.T.T. in Adelaide in 1908/9, and also for the Ballarat, Bendigo and North Melbourne Tramway Companies.

By 1926 they were also importing motor cars, and building motor bodies with sole agency for Studebaker, and British Standard cars and for Thornycroft trucks.

44. DUNCAN MOTORS LIMITED 50 Franklin Street

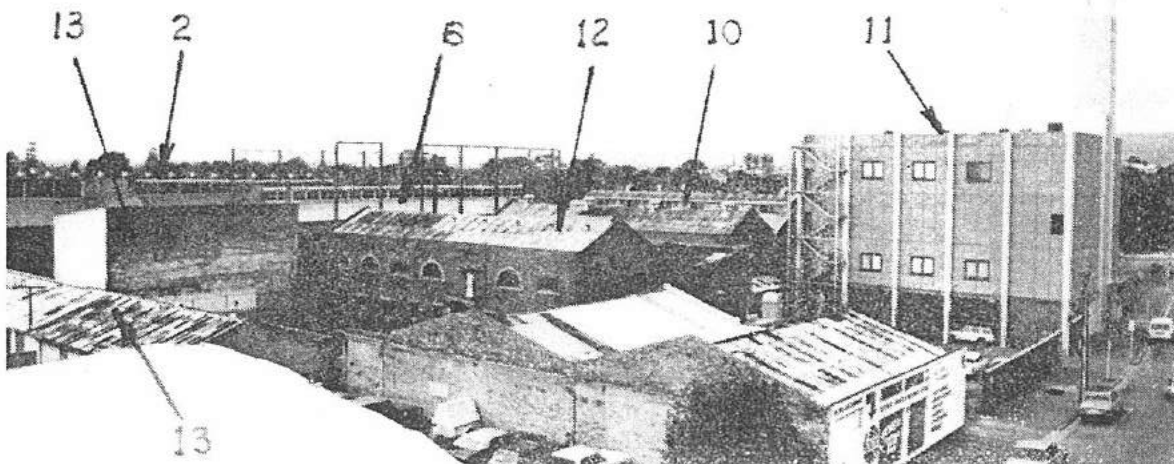
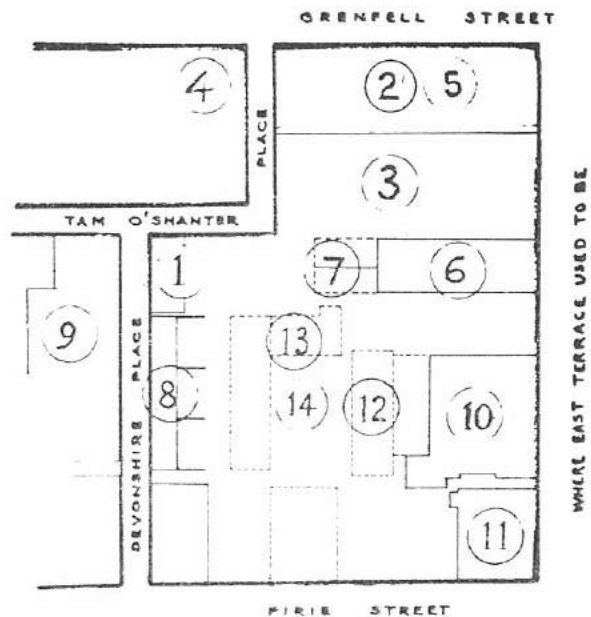
Agents for Rugby cars and commercial vehicles.

A much used Site



Once upon a time there was a soap factory in Adelaide, standing on a block of land bounded by Grenfell Street and East Terrace. It was there when the Electric Lighting and Traction Company, fore-runner of the Adelaide Electric Supply Co and ETSA, built its first Power Station at Nile Street in Port Adelaide. But one night in the late 1890s the soap factory burnt—very spectacularly—to the ground, leaving a vacant block.

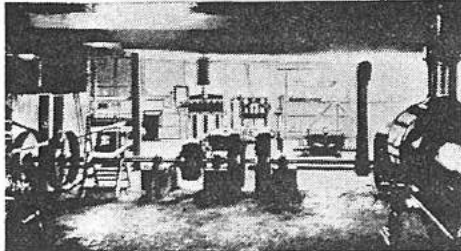
That block of land was subsequently acquired by the Electric L & T Co and with additions has been much used ever since. At one stage every activity of the company took place on, or was controlled from, that one place. If Nile Street is our "birthplace" then Grenfell Street is our Childhood home.



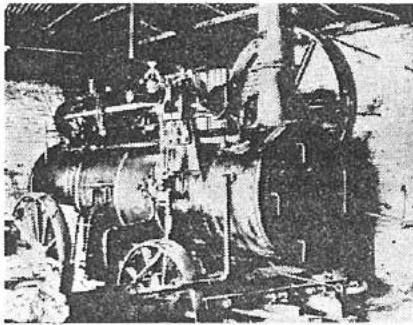
1.

In 1899 the Company entered into its first contract to supply electricity into the City of Adelaide. (The contract was with the City Council to light King William Street, but arrangements with shopkeepers in Grenfell Street followed quickly.) Two Brush arc-lighting machines and a small 110 volt DC generator were installed. They were housed in an old tin shed off Tam O'Shanter Place which at that time was so unsavoury that it was known as 'Blood Alley'. So much for our beginnings.

The shed was later replaced with a two-storey brick store for cables. It is still there today and houses an 11 Kv capacitor bank which assists in controlling voltage in the East end of the city.



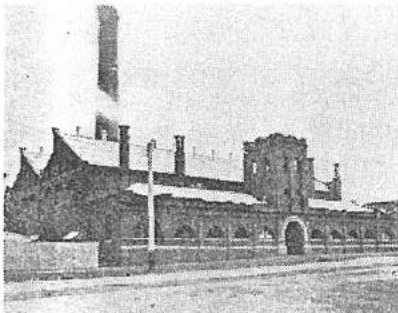
THE TEMPORARY POWER HOUSE



THE ENGINE

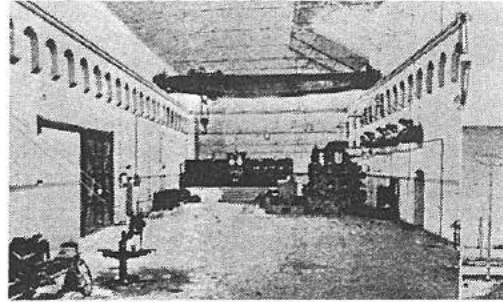
2.

Building of the Grenfell Street Power Station started in 1900 and power was available from it in 1901. A variety of plant was installed over succeeding years—two 100 HP Willans valve engines driving 50 kilowatt 200 volt DC generators, one 360 HP Willans engine generating 400 volts DC, and two Tosi Ganz AC sets which had been designed for 40 Hertz but were driven faster to make 50 Hertz and from time to time protested by sending their valves onto the roof of the pub next door. In 1908 two 750 kW Bellis sets were installed to supply Direct Current to the Tramways. Another of these was added in 1911. Business boomed. Two 2000 kW AC sets were added in 1913 and 1914 and a 1000 kW "turbo rotary



GRENFELL STREET, 1911

combination" in 1915. Six DC to AC motor generator sets (two 750 kW, one 500 kW and three 200 kW) were packed in wherever there was room between the bigger sets.



INSIDE ENGINE ROOM, 1903

3.

No less than ten Babcock & Wilcox boilers fed all these machines through a common header. Two brick chimneys and eight cooling towers dominated the sky line of that end of the city. Coal arrived by horse and cart at the East Terrace end.

4.

The "pub next door". It was renamed The Electric Light Hotel and legend has it that a flying fox served the upper floor of the Power Station.

5.

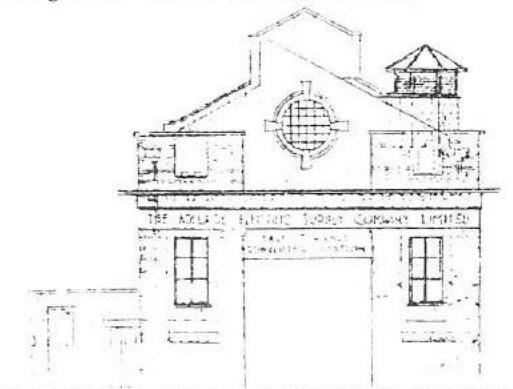
In 1912 the engine room on Grenfell Street was extended in the form as it stands today (occupied now by a Panorama TAFE School) to provide accommodation for the entire Company Headquarters. There was a Public Office, Show Room, Board Room, General Office, a Laboratory and Instrument Test Room, a Works Entrance and Change Room. Also there was an office for the Station Superintendent and Main (sic) Superintendent also a room each for the secretary, the Engineer, the draughtsman and the typist. Stores Department was located in a convenient hole in the Engine Room Basement.

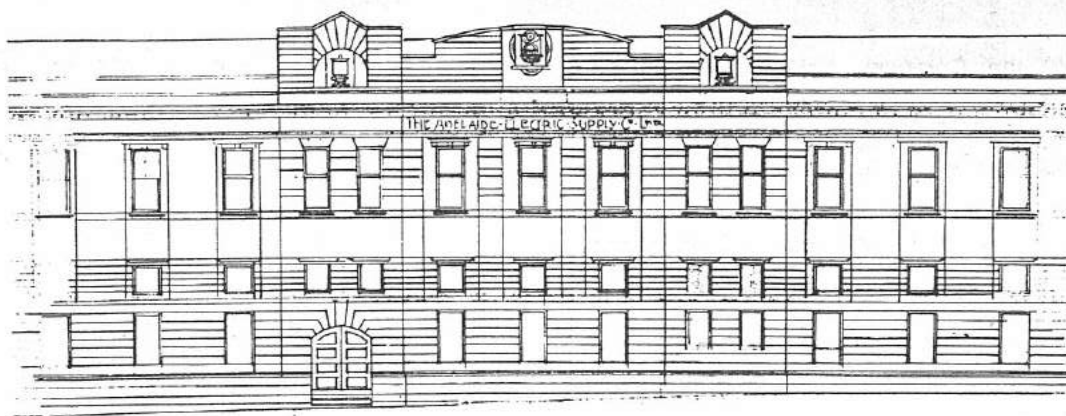
6.

In 1923 the Rotary Converter Station was built to supply DC to the Tramways and other consumers throughout the city.

As Grenfell St. Power Station waned, power was brought into this corner of the city by 33 kV line from the new Osborne "A" Station, and circuit breakers were installed here to handle this.

When the Tramways converted to buses and the last of Adelaide's lifts converted to AC, this building became a 66 kV substation with a switchyard to the North and a transformer yard to the South. (Digging foundations for this work was full of surprises. What do you do with a running drain full of tomato sauce?).





7.

The first Mains and Meter Department was established at the West end of the converter station with the power house workshop and the Transformer Store underneath.

Later this became the East Terrace Telephone exchange, the heart of the Trust's telephone network. Nothing stays static, there are changes afoot for this too.

8.

Originally several cottages and a pickle factory, this is now an 11kV switchhouse, part of the 66/33/11 kV station associated with the converted converter house. Don't ask us to explain how it all fits in, cables come and go all over this area!

9.

The Garage was located off Devonshire Place. In 1900 the Company was allowed one horse and cart "on condition it remains in continual employment". The horse died after three weeks—perhaps it was employed too continually? In 1910 came the first motor car, a two cylinder Renault. The garage remained in use until the Trust vacated the old Foy and Gibson building a few years.

10.

This building was erected by the Municipal Tramways Trust in 1907 to distribute electricity supplied from the Grenfell Street Power Station. It contained converters, batteries and boosters, and from here direct current at 600 volts was sent out by overhead lines through the parklands to the tramway system. (The lines were identified with Greek letters, Epsilon Gamma Lambda and

so on). It was in continuous use for over 50 years until the last of the electric trolley buses ceased running in Adelaide. We are now the owners. (This is the only building on the site which is not still in active use, but there are proposals for this too).

11.

This was the outdoor location of the Tramways line terminals, a maze of angle towers and cross-arms. The technology was quite unlike ours, even the poles were "Bates poles" not "Stobies". When the Tramways ceased using it, the land was acquired by the Trust and a new system control centre was built there in 1967.

12.

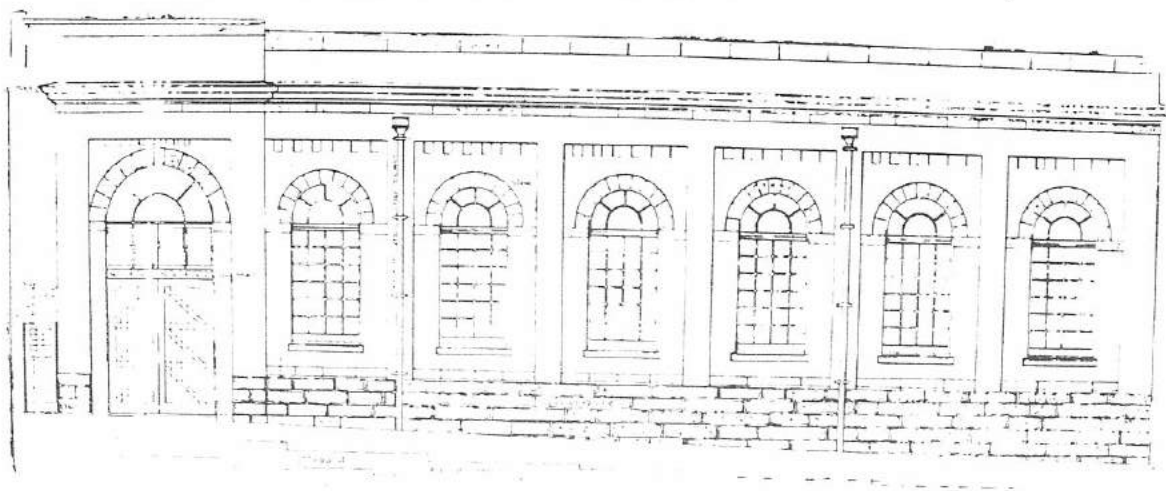
And still they come! These were Tramways additions over the years—blacksmith's shop, miscellaneous workshops and storage. Of no particular merit and riddled with white ants, they were pulled down this year.

13.

A featureless brick box with a huddle of tin sheds, this was for many years the Store for Adelaide Depot. In 1952 our system control centre was moved here from cramped quarters in Kelvin Building, but it soon outgrew this location also. The main building is currently used as a Relay Training School, the tin sheds were removed this year.

Well, that could be the end of our story. But it isn't. Intrigued by the recent demolitions at our numbers 12 and 13 we enquired further and learnt that plans are in hand for yet another series of changes here, involving some very modern technologies.

We turned to John Birdsey, Design Engineer Substations for details. With typical enthusiasm he told us all about it. In his words—



"The City of Adelaide including North Adelaide is supplied from four substations, North Adelaide, Hindley Street, Whitmore Square and East Terrace. These substations are in turn supplied at 66 000 volts by lines from Northfield and Magill substations which are connected to the 132 KV and 275 KV transmission lines from our power stations.

The consumption of electricity in the City of Adelaide is increasing at about 5% per annum and in the summer of 1984/85 the peak demand is expected to approach the total capacity of the 66,000 volt lines. The System Planning Engineer has studied how to strengthen the supply to the City of Adelaide and has recommended that reinforcement be undertaken by means of an underground cable operating at 275,000 volts from Magill substation to East Terrace substation, a distance of 8 kilometres. This will be the first time the Trust has embarked on an underground cable installation at this voltage. The installed cost of this cable is about \$1000 per metre.

In 1946 "East Terrace" was a 33,000 volt substation supplied by overhead lines from Osborne and from the Norwood substation, while the city itself was supplied at 33,000 volts via underground cables. In 1952 the 33,000 volt lines were upgraded to 66,000 volts to supply the increasing city loads and in 1968 an 11,000 volt supply system was added to supply the spreading south-eastern portion of the city. Now we have to bring in power at 275,000 volts as well.

As has been said, some of the buildings at East Terrace have historical significance, and if you care to view them from the elegant parklands adjoining you will no doubt agree that they are handsome in their own right. To develop a conventional outdoor 275,000 volt substation would require the removal of all these old buildings and leave no room for any landscaping or other aesthetic treatment.

It was decided to adopt a modern trend and use gas insulation for the substation. The gas is sulphur hexafluoride (SF6) which is such an effective insulator that it permits the high voltage conductors to be enclosed in metal ducts with quite small clearances between conductors, and within the enclosing duct. The gas is heavier than air and is non-toxic. Within the gas-tight enclosures of the equipment the gas is maintained at a positive pressure and its density is constantly monitored to ensure the maintenance of its insulating properties.

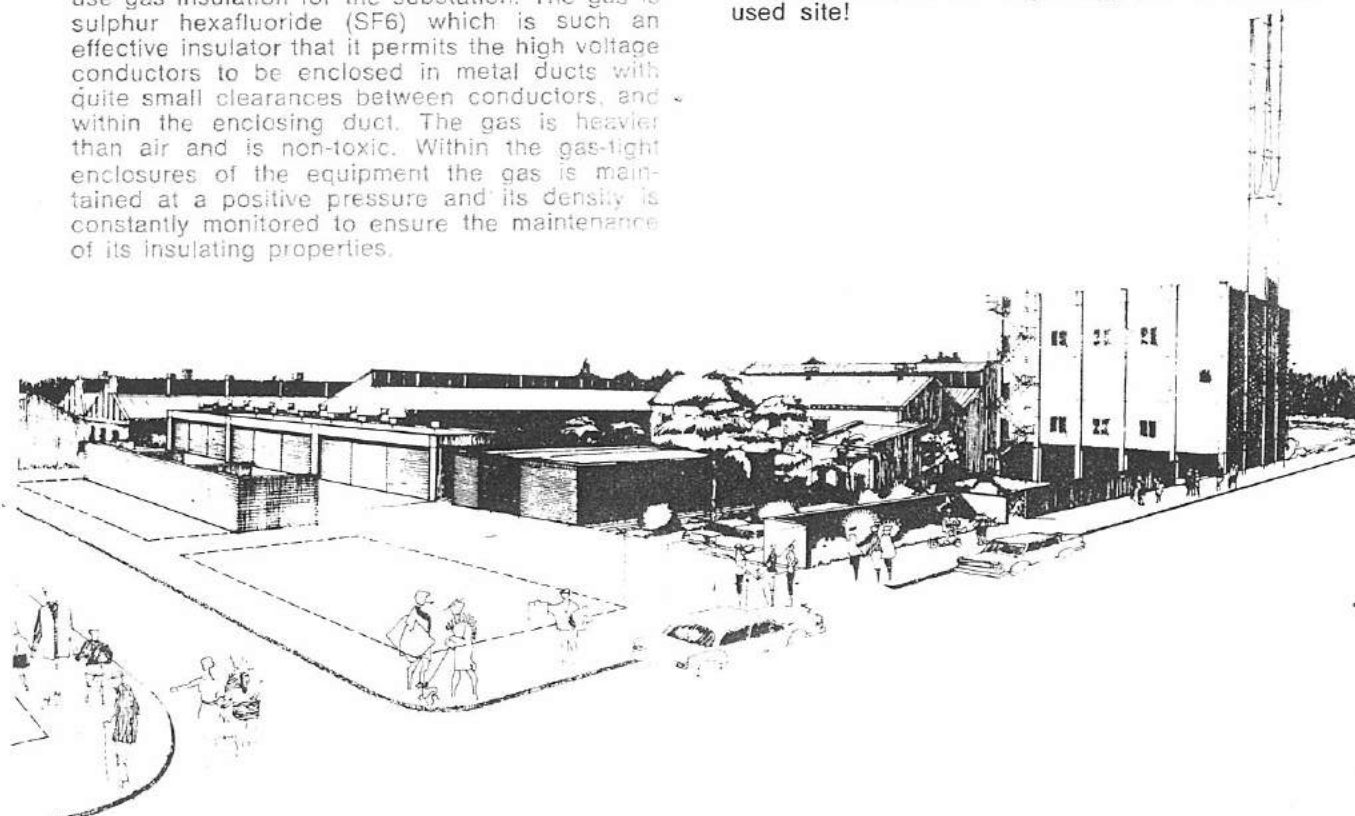
This will be the first time the Trust has used complete gas insulated equipment although outdoor high voltage circuit breakers using SF6 as the arc extinguishing medium have been in service on our system for about 5 years. The big advantage here is that all the equipment can be compressed into two small buildings.

Architects were engaged to advise on the best development of the site. The buildings with historic value were identified and the new buildings were located so that nothing of value would be lost.

After agreement was reached on the basic electrical design and corresponding aesthetic treatment of the buildings and site, Preece Cardew International was given the task of project management including detailed design. They in turn are using the consulting firm of Kinhill for civil works while Hassell and Partners continue to provide the architectural services. The first stage of the substation comprising one 225 MVA, 275/66 kV transformer, new 66 kV gas insulated switchgear, one 275 kV underground cable from Magill substation and the associated gas insulated connections from cable to transformer, is scheduled to be commissioned in May 1984. (All this will fit neatly into the small area which has been cleared. We have marked this as number 14 on our map). The second stage comprising a second transformer and 275kV underground cable from Magill substation is expected to be needed by about 1987. A third stage comprising the third transformer may be required in the late 1990s.

Upgrading of the telephone system will also be undertaken within the next two years by the installation of a fully automatic exchange at a new location. The early System Control Centre, now used as a training centre, and the telephone exchange building will be removed to make way for these later stages of the 275 kV development on the site."

As we said at the beginning, this is a much used site!

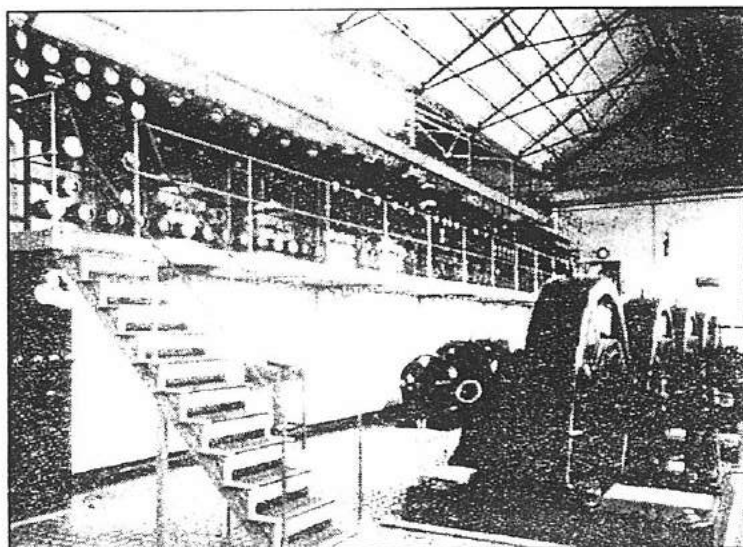


THE NO1 CONVERTER STATION

VISITOR'S GUIDE

WELCOME to The No1 Converter Station of Adelaide's Municipal Tramways Trust. It was built in 1908 to house the rotating machines which converted alternating current electricity to the direct current needed to power the traction engines of Adelaide's tramway cars. From the mid 1950's, the electric trams were rapidly replaced with diesel buses and The No1 Converter Station closed in 1956. The last of the suburban trams (except for the Glenelg tram which still operates today) ran on 22 November 1958.

The building was purchased by ETSA in 1963. Used first as a store, it was partially converted to office space in 1984 but with minimal impact on the original structure. The No1 Converter Station was entered in the Register of State Heritage Items on 14 February 1985. To realise its potential as a valuable property asset, the building has now been adapted to provide modern office accommodation while preserving its industrial character and heritage.

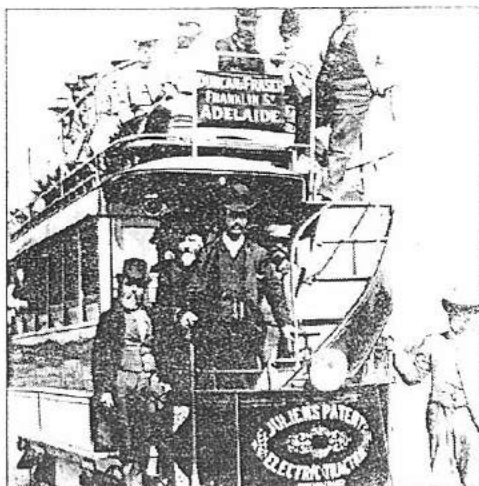


Interior of the engine room, looking north. Only one of the two cast iron stairways remains and is now located on the other side of the gallery.

AS early as 1889, the Adelaide and Hindmarsh Tramway Co Ltd had an experimental electric tram which used the Julien system of storage battery. It was built by the Adelaide firm of Duncan and Fraser and used the double-decker horse tram design familiar to visitors to Victor Harbor. There were also one or two trials with steam cars but they didn't seriously challenge the horse-drawn variety. Between 1875 and 1907, the horse tram companies flourished. When they were taken over by the Municipal Tramways Trust on 4 February 1907, their assets were valued at more than £280 000. They had 163 horse trams running on 5.3 miles of track.

The MTT had been established by an Act of Parliament on 22 December 1906. Its task was to provide a more up-to-date electric tramway service within 10 miles of the Adelaide GPO. W G T (later Sir William) Goodman was appointed the first Electrical Engineer.

In January 1889, this experimental battery-powered tramcar (far left) made several successful runs to Henley Beach.





GOODMAN began planning a power station at Port Adelaide (where coal from New South Wales was unloaded). In the meantime, the MTT entered into an agreement with the Adelaide Electric Supply Company for a temporary supply of "motive" power. At about the same time (December 1907), AESCo decided to close its own power station at Port Adelaide and supply all of its customers from its new power station and the adjacent converter station at Grenfell Street. The MTT chose a site for its converter station alongside AESCo on East Terrace and purchased land from several owners, including a yard owned by a Dr Whittle.



The site chosen for The No1 Converter Station overlooked the East parklands as shown in this 1876 engraving

The site was occupied by a number of other structures including some two-story row houses with picket fences and first-floor balconies overlooking the park-lands (although behind these otherwise desirable homes were

a saw mill and the site of Burford's soap factory which had burned down several years before). On 30 January 1908, the MTT appointed the architectural firm of English and Soward to design the building.

Perhaps its most impressive feature is the front or eastern elevation which is based on the Romanesque Revival style which can be seen on other buildings, notably the old mail exchange at 101-107 Grenfell Street. The date stone of polished granite, to the right of the main door, presents a little mystery: no one today knows why the Maltese Cross and the Star of David were chosen as ornaments.



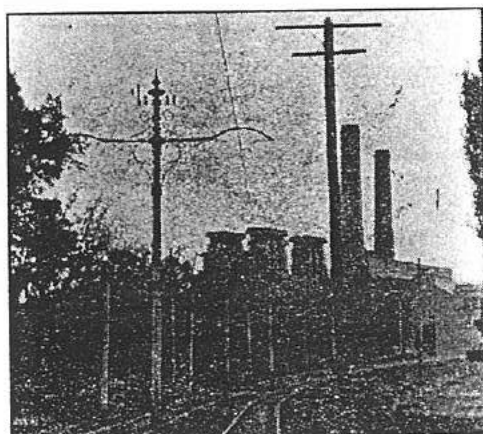
Why all the converter stations?

Why not generate the right kind of electricity in the first place? The reason was the need for two types of electrical power: direct current, like that supplied by a battery, and alternating current. At the turn of the century, the main applications of electricity were arc lamps and traction engines. Both of these required DC. On the other hand, the economic distribution of electricity from a central power station has to take place at high voltage which must then be reduced again to a level that customers can use. The electrical transformer which does this job only works with AC.

AESCo had to have AC for the high voltage line to Port Adelaide and for extensions to other suburbs; but it still had many DC loads to supply in Adelaide (in fact, the last one — a lift motor — was only removed in 1967). The MTT, on the other hand, had to transmit high voltage AC power from Port Adelaide and then convert it to DC for its electric trams. The inter-connection of power stations and converter stations, with their different voltages and frequency, became an interesting technical exercise which occupied the next 50 years and almost all of Town Acres 155 and 156.

THE No1 Converter Station used rotary machines and transformers to provide 600 volts DC for the tramcars. Originally five 500 kilowatt machines sat on the delicately tiled floor at East Terrace and spun the AC into DC. One was removed to the No2 Converter Station on the Henley Beach line and replaced with a 1500 kilowatt machine. Meters and switches installed by the Adelaide firm of Unbehaun and Johnson were housed on a gallery raised above the machine floor and reached by two elegant cast iron stairs. Each machine was served by three transformers located on the other side of the gallery wall. The perimeter walls of the Engine Room are face brick with a tiled dado (decorative lower section) which still has the original tiles and is generally in very good condition. The adjacent battery room contained a battery bank with a 1000 ampere-hour capacity. This area still has the original timber trusses and timber lined ceiling. The engine room has steel trusses and a clerestory skylight above the centre bay.

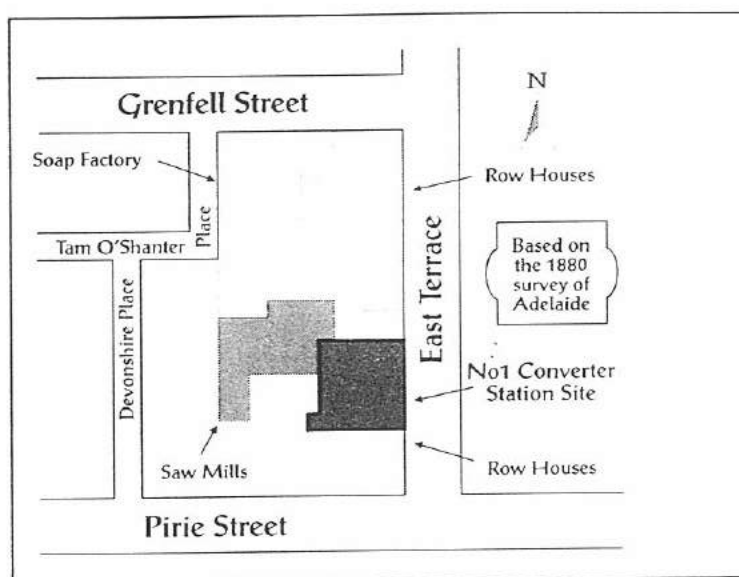
THE date stone says 1908: there is no record of an official opening but the tenders for the building were opened on 23 June and the first progress payment was made to C H Martin on 11 August 1908. Three months later, an electric car was taken for a trial run along North Terrace and so construction of the building and installation of the equipment must have proceeded rapidly. The official opening of the first electric tramcar route to Kensington was on 9 March 1909 but work continued on The No1 Converter Station until June that year.



WITH its new converter station in operation, the MTT got on with the job of electrifying Adelaide's public transport. The first order of 100 tram car bodies was let to the Adelaide firm of Duncan and Fraser. The design was referred to as a "California" type combination open and closed car, and resembles a San Francisco cable car. Construction of the bodies began in the machinery building of the Jubilee Exhibition Grounds in Frome Road. The work then transferred to the MTT's new Hackney Depot which had been established on a site formerly occupied by the Government Experimental Orchard.

The conversion of existing tramways to electric traction and the construction of new lines proceeded but many of the new services could not be opened until the power station at Port Adelaide was completed. Situated off Ocean Steamers Road on the northern side of No2 Dock, it was officially opened on 7 June 1911 with a generating capacity of 4500 kW.

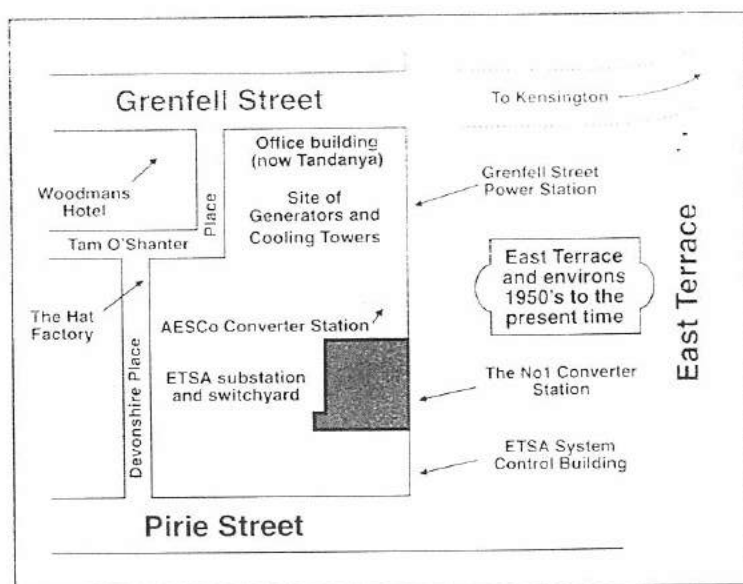
The principal suburban route was to Henley Beach, a destination an MTT brochure described as one of Adelaide's "beautiful tram rides". The No2 Converter Station was part-way along that route in Henley Street, Mile End.

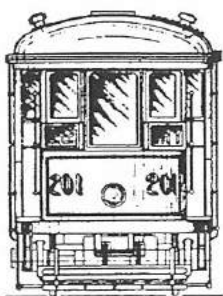


IN THE Roaring Twenties, private motor bus operators began to compete for suburban passenger business. The MTT cheerfully entered the fray and issued instructions to their motormen to take as much business as possible away from the buses. On occasions, this involved a sudden reversal of direction if passengers were seen on the other side of the road.

Looking along the Kensington tramline (far left) to the Grenfell Street power station with its timber-framed cooling towers

The triumph of the electric trams over the internal combustion engine, however, was short-lived. In 1924, William Goodman went overseas and placed orders for Mack buses. The first was imported from America as a complete unit and Holden Motor Body Builders built the coachwork for another 39. The MTT then bought a number of Garford double-decker buses from the South Australian Railways. Ironically, one of these was converted to electric traction in 1932 and became Australia's first trolley bus.





Goodman's design for a new 74 seat car to be built after World War I: two of its three saloons were reserved for smokers

DURING World War II, the MTT and AESCo systems were interconnected as a security measure. However, the MTT generated power at 25Hz while AESCo generated at 50Hz. A frequency changer was therefore installed at the MTT's Port Adelaide power station. It saw little use during the war but in later years it enabled the MTT to take supply from the ETSA system.

After World War II, with petrol rationing over and motor cars freely available, patronage of the tramways began to decline. In 1951, a Royal Commission on Transport suggested that the MTT use ETSA power rather than generate its own. Work began in 1952 to change from the MTT standard of 11kV 25Hz to ETSA's 7.6kV 50Hz. No new tramways were built and existing services began to be replaced with diesel or trolley buses.

A new Tramways Board took office from 30 January 1953 and made plans to replace all the tramways with buses (including the Glenelg line — although, fortunately for transport enthusiasts, this didn't happen). Over the next four years, tram services were progressively closed. The Reedbeds Viaduct at Fulham was showing signs of white ant damage and the planned conversion of lines to the north east were shelved in favour of the immediate conversion of the Magill-Richmond and Kensington Gardens-Henley North services to motor buses. The last electric trams ran on these routes on 2 February 1957.

THE NO1 CONVERTER STATION

This monograph was compiled by **Richard Venus** from various fragments including old company records and the conservation reports for the No 1 Converter Station and its next-door neighbour, the former Grenfell Street power station. Like most previously unrecorded stories, this one was — and still is — full of mysteries: if you have any information about the history of the present and previous occupants of this

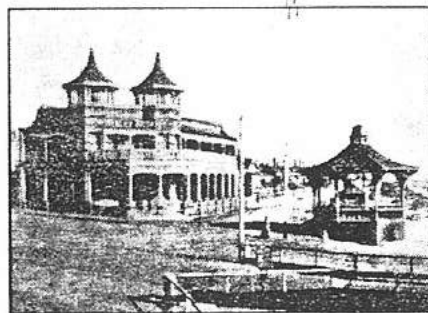
site, please tell us. In the meantime, enjoy the most recent "conversion" which has been planned by Hassell Design and Architects. Occupied by ETSA's Marketing Services and Major Customer Accounts departments on 12 July 1993, it still remains part of the history of Adelaide's electrification.

The No1 Converter Station
51-55 East Terrace
Adelaide South Australia

The power system was also being reconstructed so that the MTT power station could be closed. In 1956, two new 800kW mercury arc rectifiers were installed in the The No1 Converter Station to replace obsolete rotary converters. Steam generation ceased on 29 June 1956. The MTT station was now only supplying power at peak times: at all other times it came from direct ETSA supply to the converter stations or via the power station frequency changer. The frequency changer at Port Adelaide continued to supply the Malvern converter station until the Springfield and Mitcham tramlines were closed. The MTT power station was demolished in 1958.

Beautiful Tram Car Rides

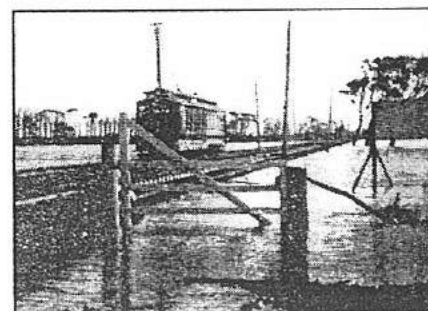
(from the MTT Pocket Guide, 1911)



Henley Beach is a popular seaside suburb half an hour's tram ride from the city and a favourite resort on hot summer nights when the Adelaide Electric Tramways Band performs in the rotunda owned by the Trust.

The tram car on its journey passes through the growing suburb of Torrensville and crosses the rich pastoral country at Fulham by means of a viaduct half a mile long which raises the track eight feet above the winter floods.

The round trip from the Railway Station on North Terrace takes 70 minutes and costs five pence each way. Cars run every 10 or 20 minutes.



Electricity Trust of South Australia

Electricity Supplies to South Australians

In 1882 the South Australian government legislated 'to provide for the supply of electricity to Corporations and private persons under the South Australian Electric Company's Act, 1882'.¹ This was a private act assented to on 17.11.1882 which gave the newly formed The South Australian Electric Company, Limited, power to supply electricity.

The South Australian Electric Company, Limited, was registered and incorporated under the Companies Act, 1864, and was formed:

With the object (amongst others) to manufacture and sell electric and other machines for the purpose of electric lighting, motive power, torpedoes, and all other works and businesses of every description for which electricity now is, or at any time hereafter may be, used, and to supply therewith, under such contracts and agreements as to the directors of the company shall seem fit and expedient, the Government and municipal authorities, trustees, and churchwardens, or other persons having the management of places of public worship of all descriptions, public and corporate bodies and companies, merchants, tradesmen, shopkeepers, and the public at large, the Municipal Council of Adelaide, the Town of North Adelaide, and all other cities and areas in the Province of South Australia for empowering and better enabling the company to carry on its objects.²

The chairman of the company was Mr Charles Hawkes Tod Hart.³

At the same time as the South Australian Electric Company was given the power to supply electricity, a statute was also passed enabling the South Australian Gas Company 'to supply electricity as well as gas, under certain conditions'.⁴

However, neither the South Australian Electric Company nor the South Australian Gas Company began operations 'within ten years after the passing of the Acts' as they were required to do and, as a consequence, the authority to proceed lapsed.⁵

The next major move in regard to the supply of electricity occurred in 1891 when the Gas and Electric Lighting Act, No 531 of 1891, was passed 'enabling corporations and district councils to supply gas and electricity under certain conditions and it was optional for them at the present time to avail themselves of the provisions of the Act or not'.⁶ Discussion ensued and deputations waited upon the City Council which ultimately resulted in the corporation calling tenders from persons willing 'to lay down a plant with a right to purchase it on the part of the corporation, and for the company to lay down the

¹ State Records, GRG 13, Notes/Description; *South Australian Parliamentary Debates (SAPD)*, 25.9.1895, p.1513.

² *South Australian Parliamentary Paper (SAPP)* 26/1882, p.7.

³ *SAPP*, 26/1882, p.9.

⁴ *SAPD*, 25.9.1895, p.1513.

⁵ *SAPD*, 25.9.1895, p.1513.

⁶ *SAPD*, 25.9.1895, p.1513.

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plant, and for the corporation to work it'.⁷ Seven tenders were received with 'The Electric Lighting Company ... now seeking legislative authority to enable them to carry out their original project'.⁸ As debates in the Legislative Council at the time record:

In December, 1894, a poll of the citizens of Adelaide was taken on the question of gas versus electricity, and they decided against the corporation borrowing money to construct works and run a concern, which might or might not be profitable for a number of years. Prior to this, however, a petition signed by over 300 prominent citizens was presented to the corporation protesting against them having anything to do with the construction of works, but stating that if a private company undertook the responsibility no objection would be raised.⁹

One such private company which was formed was The South Australian Electric Light and Motive Power Company Limited. As pointed out in evidence given to the 1895 Select Committee enquiring into the private Bill submitted by the company seeking 'to proceed with electric lighting of the city or private places',¹⁰ the company had no association or connection with the Electric Lighting Company referred to earlier:

[Alexander Melrose, solicitor for the Electric Lighting and Motive Power Company appearing before the Select Committee]

This company is *bona fide* in every sense. It is independent of any other company or body of people; neither the Gas Company nor the defunct Electric Lighting Company, has any connection with it ...¹¹

The meeting to form The South Australian Electric Light and Motive Power Company Limited was held on 20.3.1895 at Universal Buildings, Grenfell Street, Adelaide, and the Certificate of Incorporation (see Appendix 1) was issued at the Supreme Court House, Adelaide, on 21.3.1895. The chairman was Hubert Giles and the company had a capital of £2,000 'divided into one hundred shares of twenty pounds each',¹² while the *Memorandum of Association* (see Appendix 1), which was passed under section 17 of the Companies Act of 1892, noted the objects for which the company was established. However, owing 'to lack of money' the private Bill that was introduced into parliament was not proceeded with by the company.¹³

In 1897 The South Australian Electric Light and Motive Power Company Limited once again was successful in having a private Bill introduced into the South Australian Parliament. Known as The South Australian Electric Light and Motive Power

⁷ SAPD, 25.9.1895, p.1513.

⁸ SAPD, 25.9.1895, p.1513. The Electric Lighting Company presumably must mean the South Australian Electric Company which was given the original authority in 1882.

⁹ SAPD, 25.9.1895, p.1513.

¹⁰ SAPD, 9.10.1895, p.1698.

¹¹ SAPP 107/1895, p.12.

¹² SAPP 107/1895, p.33.

¹³ SAPP 55/1945, p.5.

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Company's Act, 1897, assent was given on 11.12.1897 but not before the matter had again been referred to a Select Committee following petitions made against the Bill.¹⁴

One such objection was that raised by the Adelaide Corporation regarding the status of The South Australian Electric Light and Motive Power Company Limited. It was their contention that the company which had applied to the South Australian Parliament and been granted power to supply electricity in 1895 - The South Australian Electric Light and Motive Power Company Limited - was not the same company that was seeking the same powers under the 1897 Bill; that this company was not a *bona fide* company, but rather an association of persons seeking to obtain certain rights by Act of Parliament, with a view to float a Company in England, and to trade on the rights so obtained to the permanent injury of the petitioners against the Bill - that is, the Corporation of the City of Adelaide'.¹⁵ The chairman of the company, Frederick Charles Howard, giving evidence before the committee, strenuously denied the charge noting that the company 'was identical to that which sought similar powers two years ago except for some change in shareholding'.¹⁶ He further continued:

Question 19. *Have you any further statement to make?* - I should like to be allowed to answer the two petitions presented to the Legislative Council against the Bill. In the third paragraph of petition numbered 65 it is stated:- "That your petitioners have since been informed by certain persons who were shareholders in the said company and verily believe that such company sold its rights in the said Bill to certain persons whose names are unknown to your petitioners for the sum of £100. That the cash in hand belonging to the said company was some time afterwards distributed amongst its members and the company wound up". I give that an unqualified denial.

Question 20. *You say this statement is untrue?* - Yes; quite untrue. I have in my hand a letter addressed to me, and it reads thus:- "Referring to the petition of the Adelaide Corporation against the Electric Lighting Bill, that the South Australian Electric Light and Motive Power Company was wound up, I have to inform you that the said company was not wound up during my term of office as secretary. I am, sir, yours truly. JAS. S. SCOTT". Mr. Scott preceded me as the manager of this company, and I can truthfully say that no such proceedings as winding up have taken place since my appointment.

Question 22. . . . In further explanation I [F.C. Howard] might mention that some of the original shareholders in the company are still shareholders. The last paragraph in the petition states that "The South Australian Electric Light and Motive Power Company Limited, has no interest in the said Bill and is not now the promoter thereof". I assert that this is absolutely our Bill, and that we are the promoters.¹⁷

Documentary evidence was also presented to the Select Committee (See Appendix 2 and 3), with the subsequent report issued by the chairman, William Haslam, noting:

7. After the fullest hearing of evidence on both sides, your Committee are unanimous that the allegations of the opponents to the Bill have been made under a misapprehension, and cannot be sustained, and have been completely disposed of by

¹⁴ SAPP 99/1897, question 19.

¹⁵ SAPP 99/1897, report of Chairman, William Haslam.

¹⁶ SAPP 99/1897, question 7.

¹⁷ SAPP 99/1897, questions 19, 20, 22.

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oral evidence, and by statutory declaration, upon which your Committee insisted.¹⁸
(See Appendix 4)

The company commenced operations, obtaining a contract to provide street lighting in Port Adelaide but apparently was constrained by a lack of capital.¹⁹ Consequently, in September 1899, The South Australian Electric Light and Motive Power Company Limited was sold to the Brush Electrical Engineering Company Limited²⁰ and three months later, in January 1890, these interests were consigned to The Electric Lighting and Traction Co. of Australia Ltd.²¹ This company was registered in London on 17.8.1899 and 'it acquired the assets of the S.A. Electric Light and Motive Power Company, including an assignment of the Electric Light and Motive Power Company's Act of 1897, and a small power station operating at Port Adelaide, together with the right to supply electricity in the City of Adelaide'.²²

On 31.8.1904 The Adelaide Electric Supply Co. Ltd. (incorporated in London on 10.4.1905), acquired the Adelaide and Port Adelaide undertakings of The Electric Lighting and Traction Co.²³ Shortly after the management of The Adelaide Electric Supply Co. Ltd. moved from England to South Australia in 1922 an Act was passed in the South Australian Parliament amending the South Australian Electric Light and Motive Power Company's Act of 1897. One of the objects of this Act was to:

- (1) simplify proof in the courts that the Adelaide Electric Supply Company Limited was the legal successor of the S.A. Electric Light and Motive Power Company Ltd.;²⁴

The Adelaide Electric Supply Company Limited remained the main supplier of electricity in South Australia until the formation of the South Australian Electricity Trust in 1946 following recommendations made by the Royal Commission enquiring into The Adelaide Electric Supply Company.²⁵

¹⁸ SAPP 99/1897. Report of chairman, William Haslam.

¹⁹ SAPP 55/1945, p.5.

²⁰ State Records, GRG13/54/45.

²¹ Kerr, Colin and Margaret, *The Vital Spark: The Story of Electricity Supply in South Australia*, ETSA, October, 1979, p.29.

²² SAPP 55/1945, p.5.

²³ SAPP 55/1945, p.5.

²⁴ SAPP 55/1945, p.5.

²⁵ SAPP 55/1945, p.5

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CONCLUSIONS:

1. The original application to the South Australian Parliament in 1882 by The South Australian Electric Company, Limited, to supply electricity had no connection or association with the application made in 1895 by The South Australian Electric Light and Motive Power Company Limited;
2. The applications made to the South Australian Parliament in 1895 and 1897 by The South Australian Electric Light and Motive Power Company Limited to supply electricity were made by one and the same company contrary to a view then prevailing in the Corporation of the City of Adelaide;
3. Despite the fact that The South Australian Electric Light and Motive Power Company Limited did not begin to supply electricity until after the passage of the 1897 Act, the formation of the company began with the annual general meeting on 20.3.1895 and its Incorporation the following day on 21.3.1895.
4. The 1922 amendment to Section 3 of the S.A. Electric Light and Motive Power Company's Act of 1897 effectively enshrined in law that all companies up to and including The Adelaide Electric Supply Company Limited were the legal successors of The South Australian Electric Light and Motive Power Company Limited;
5. The South Australian Electricity Trust's foundations began with the formation of The South Australian Electric Light and Motive Power Company Limited.

Peter Donovan
Donovan & Associates
4 February 1993